REMARKS

Reconsideration of the subject application in view of the present amendment is respectfully requested.

By the present amendment, the specification has been amended to correct formal errors therein. (A marked-up copy of respective paragraph is enclosed). Claims 1-6 have been cancelled. Claims 7-11 have been added.

Based on the foregoing amendments and the following remarks, the application is deemed to be in condition for allowance, and action to that end is respectfully requested.

The Examiner rejected Claims 1 and 3-5 as anticipated by Neukirchen, et al., U.S. Patent No. 5,492,187 (Neukirchen).

Claims 2 and 6 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Neukirchen in view of Hauptmann, et al., Publication US '2001/0013430 (Hauptmann 430).

Claims 1-6 have been canceled.

It is respectfully submitted that claims 7-11 are patentable over the prior art.

Claims 7 and 11 correspond in scope to claims 2 and 6 which were rejected as being unpatentable over Neukirchen in view Hauptmann. However, Hauptmann '430 is not a prior art against the instant application.

Hauptmann '430 has a U.S. filing date of February 7, 2001. The instant application is entitled to a priority date of January 17, 2001, *i.e.*, before the U.S. filing date of Hauptmann '430. To overcome Hauptmann '430 as a reference, a certified translation of the priority German Application DE-101 17 262.1, in accordance with 37 C.F.R. § 1.55(4), is enclosed.

In view of the above, it is respectfully submitted that claims 7 and 11 and claims 8-10, dependent on claim 7 are in condition for allowance.

CONCLUSION

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance, and allowance of the application is respectfully requested.

Should the Examiner require or consider it advisable that the specification, claims and/or drawings be further amended or corrected in formal respects, in order to place the case in condition for final allowance, then it is respectfully requested that such amendment or correction be carried out by Examiner's amendment and the case passed to issue. Alternatively, should the Examiner feel that a personal discussion might be helpful in advancing this case to allowance, the Examiner is invited to telephone the undersigned.

Respectfully Submitted,

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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail and addressed to: Commissioner for Patents, Washington, DC 20231 on April 30, 2003.

Alexander Zinchuk

RT-6057

U.S. Serial No. 10/050,223

Version with Markings Showing Changes Made

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a drilling head of a rock drill for use in a rotary-percussion power tool for removing stone and stone-like material such as, e.g., concrete.

2. Description of the Prior Art

Rock drills, which are used in hand-held power tool, have, at one end of their stems. a shank and, at the other, opposite end, a drilling head with cutting elements formed of a hard material. The cutting elements are usually formed as cutting plates or bits. Alternatively, the entire drilling head with the cutting elements can be formed of a hard material. A drawback of this type of drilling heads consists in that upon striking a reinforcing metal during the drilling of concrete, the cutting edges ~~a~~ are subjected to an increased load. This is particularly the case when the drilling heads are formed with a pointed wedge angle that is particularly suitable for an increased drilling capacity of the tool.

Accordingly, an object of the present invention is to increase the service life of a drilling head.

Another object of the present invention is to reduce the danger of the drilling head being fractured upon striking reinforcing metal.

SUMMARY OF THE INVENTION

These and other objects of the present invention, which will become apparent hereinafter, are achieved by providing a drilling head formed of a hard material and having a main bit and at least one auxiliary bit provided exclusively in a radially outer region of the drilling head and having an arcuate cutting edge.

The arcuate shape of the cutting edge of the auxiliary bit increases the cutting edge length in the tangential direction in which it is primarily loaded upon striking reinforcing metal. This increases the load resistance and the service life of the drilling head.

Advantageously, the arcuate cutting edge of the auxiliary bit is ~~extensively~~ circumferentially axially rounded. This insures that upon the auxiliary bit cutting

edge and opposite cutting surfaces striking the reinforcing metal, the drill is axially lifted.

Advantageously, the drilling head has two auxiliary bits which are, advantageously, are arranged symmetrically with respect to the main bit. This permits to reduce the vibration noise.

Advantageously, the main bit has two cutting edges which are diametrically offset relative to each other and are connected at the drilling head tip by a top edge. This insures obtaining of stable drilling characteristics.

Advantageously, the auxiliary bit is arranged axially behind the generating curve of the main bit, which provides for a possibility to increase the force acting on the main bit which in turn, increase the drilling capacity of the drill.

Advantageously, the auxiliary bits form in a radial plane a pointed wedge angle between 50° and 80°. This insures a more aggressive penetration of the auxiliary bit(s) into a hard material, thereby increasing the drill drilling capacity.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figs. 1-2 show a drilling head 1 according to the present invention which is completely formed of a hard material and ~~forms of a hard material and~~ forms part of a rock drill for use with a hand-held power tool. The drilling head 1 has a main bit 2 and two diametrically opposite auxiliary bits ~~2a~~ 3a, 3b arranged symmetrically relative to the main bit 2 in radially outer region of the drilling head 1. The auxiliary bits 3a, 3b have, respectively arcuate, ~~extensively~~ circumferentially axially rounded, edges 4a, 4b. The main bit 2 has two cutting edges 5a 5b which are connected at the drill tip by a top edge 6. Both auxiliary bits 3a, 3b have an arcuate length of about $\pi/4$ radian.

The portion of the drilling head 1, which is shown in side view in Fig. 2, has an axially offset, with respect to the drilling head axis A, auxiliary bit 3a which is spaced by a distance X from a generating curve 7 of the main bit 2. This auxiliary bit 3a forms, in a radial plane extending transverse to the auxiliary bit cutting edge 4a, a pointed wedge angle α of about 65°. The wedge angle α defines two, partially concave, cutting surfaces 8a, 8b.

DT-6057

UNITED STATES PATENT AND TRADEMARK OFFICE **ANNEX U.S. 111**

I, the below-named TRANSLATOR, HEREBY DECLARE THAT:

My name and post-office address are as stated below:

That I am knowledgeable in the English language and in the language in which the below-identified international application was filed, and that I believe the English translation of the German application Serial No. 101 17 262.1, filed in the German language is a true and complete translation of the above-identified application as filed.

I further declare that all statements made herein on my own knowledge are true and that all statements made on the information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the *United States Code* and that such willful false statements may jeopardize the validity of the application or any registration resulting therefrom.

Date: April 30, 2003

Full name of the translator: ALEXANDER ZINCHUK

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New York, NY 10021

DT-6057

ROCK DRILL

The present invention relates to a rock drill driven by a rotary-percussion hand-held power tool for an abrasive removal of stone and stone-like material such as concrete.

Rock drills for hand-held power tools, have, at one end of their stems, a shank and, at the other end, a drilling head with cutting elements formed of a hard material. The drilling head is provided with cutting plates or bits formed of hard material or the entire drilling head can be formed of a hard material. A drawback consists in that upon striking a reinforcing metal, the cutting edges are subjected to an increased load, in particular when the drilling heads are formed with a pointed wedge angle that is particularly suitable for an increased drilling capacity of the tool.

According to British Publication GB 530113A, a drilling head of a rock drill has a main cutting plate and two auxiliary cutting plates radially offset relative to the main cutting plate and having their cutting edges extending parallel to each other.

According to European Publication EP 607958A1, in a rock drill for a hand-held power tool, two auxiliary cutting plates, which have their

cutting edges extending parallel to each other, are radially spaced from the main cutting plate by different distances.

According to U.S. Patent No. 5,492,187, a rock drill for a hand-held power tool with a compact drilling head formed entirely of a hard material has a diametrically extending main bit and two auxiliary bits which are provided exclusively in radially outer region, with the auxiliary bits trailing the main bit and extending at an acute angle in the drilling direction, and with the cutting edges of the auxiliary bits extending radially. Because of a rapid wear of the main bit, which is arranged axially, the axial distance between the main bit and the auxiliary bits becomes reduced which, in turn, reduces the drilling capacity of the drill and its service life.

An object of the present invention is to reduce the danger of the drilling head being fractured upon striking reinforcing metal. A further object consists in increasing the service life.

The object is substantially achieved by the features of the independent claim. Further improvements follow from the sub-claims. Substantially, the drilling head formed of a hard material for a hand-held power

tool has a main bit and at least one auxiliary bit provided exclusively in a radially outer region of the drilling head and having an arcuate cutting edge.

The arcuate shape of the cutting edge of the auxiliary bit increases the cutting edge length in the tangential direction in which it is primarily loaded upon striking reinforcing metal and, thus, has an increased load resistance upon striking a reinforcing metal and an increased service life.

Advantageously, the arcuate cutting edge of the auxiliary bit is circumferentially axially rounded, whereby upon the auxiliary bit cutting edge and opposite cutting surfaces striking the reinforcing metal, the drill is axially lifted.

Advantageously, the drilling head has two auxiliary bits which are, advantageously, are arranged symmetrically with respect to the main bit, whereby the vibration noise is reduced.

Advantageously, the main bit has two cutting edges which are diametrically offset relative to each other and are connected at the drilling head tip by a top edge, which insures stable drilling characteristics.

Advantageously, the auxiliary bit is arranged axially behind the generating curve of the main bit, whereby due to the increase of the force acting on the main bit, the drilling capacity of the drill increases

Advantageously, the auxiliary bits form in a radial plane a pointed wedge angle between 50° and 80°, which insures an aggressive penetration of the auxiliary bits into a hard constructional component and an increase of the drill drilling capacity.

Advantageously, the length of the cutting edge of the arcuate auxiliary bit is so selected that they and the main bit are subjected to the same amount of the axial wear, whereby an increased drilling capacity is achieved over an increased service life.

The invention will be explained in detail with reference to an advantageous embodiment, with:

Fig. 1 showing a top view of a drilling head, and

Fig. 2 showing a side view of a portion of the drilling head.

According to Fig. 1, a drilling head 1, a top view of which is shown and which is completely formed of a hard material and forms part of a rock drill (not shown further), has a main bit 2 and two diametrically opposite auxiliary bits 3a, 3b arranged symmetrically relative to the main bit 2 in radially outer region of the drilling head 1 and having, respectively, arcuate, circumferentially axially rounded, edges 4a, 4b. The main bit 2 has two cutting edges 5a 5b which are connected at the drill tip by a top edge 6. Both auxiliary bits 3a, 3b have an arcuate length of about $\pi/4$ radian.

According to Fig. 2, which shows a side view of a portion of the drill head 1 of a rock drill for a hand-held power tool, the axially offset, with respect to the drilling head axis A, auxiliary bit 3a which is spaced by a distance X from a generating curve 7 of the main bit 2, has in a radial plane extending transverse to the auxiliary bit cutting edge 4a, a pointed wedge angle α of about 65° which defines two, partially concave, cutting surfaces 8a, 8b.

CLAIMS:

1. A rock drill for a hand-held power tool, having a drilling head (1) formed completely of a hard material and having a main bit (2) and at least one auxiliary bit (3a, 3b) provided exclusively in a radially outer region, characterized in that the axialliary bit (3a, 3b) has an arcuate cutting edge (4a, 4b)

2. A rock drill according to claim 1, characterized in that the arcuate cutting edge (4a, 4b) of the auxiliary bit is circumferentially axially rounded.

3. A rock drill according to claim 1 or claim 2, characterized in that the main bit (2) has two, diametrically offset, cutting edges (5a, 5b) which, optionally, are connected, at a drilling head tip, by, a top edge (6).

4. A rock drill according to any of preceding claims, characterized in that the auxiliary bit (3a, 3b) is axially offset with respect to a generating curve (7) of the main bit (2).

5. A rock drill according to any of preceding claims characterized in that auxiliary bit (3a, 3b) forms, in a radial plane, a pointed wedge angle (α) between 50° and 80°.

6. A rock drill according to any of preceding claims, characterized in that the auxiliary bit (3a, 3b) having an arcuate cutting edge (4a, 4b) has a length such that it has the same axial wear as the main bit (2).

ABSTRACT

A rock drill for a hand-held power tool and having a drilling head (1) formed completely of a hard material and including a main bit (2), and at least one auxiliary bit (3a, 3b) provided exclusively in a radially outer region (Fig. 1) and having an arcuate cutting edge (4a, 4b).